Remarks

Claims 1-3 were pending in the subject application. By way of this Amendment, claims 1-3 have been canceled and claims 4-28 have been added. Accordingly, claims 4-28 are now before the Examiner for consideration. Favorable consideration of the claims now presented is earnestly solicited.

The Office Action indicates that the subject specification is objected to for various informalities. Submitted herewith is a substitute specification (marked-up and clean versions), wherein these informalities have been corrected. The specification has also been amended to recite the composition by % (m/m) of materials classified under the ISO 5832/7 standard, as disclosed in the subject application, in accordance with the International Organization for Standardization (ISO). No new matter has been added by way of this Amendment.

Claim 3 was objected to because the Office Action questioned whether "39% cobalt" should have been "39 to 41% cobalt" disclosed on page 1. Claim 3 has been canceled and new claims 10 and 23 incorporate the Examiner's suggestion to replace "39 % cobalt" with "39 to 41% cobalt." The applicant expresses gratitude to the Examiner for bringing this to the applicants attention.

Claims 1-3 have been rejected under 35 U.S.C. § 112, second paragraph and claims 1-3 have been rejected under 35 U.S.C. § 101. Claims 1-3 have been canceled and new claims 4-28 have been added, rendering these grounds for rejection moot. Accordingly, applicant respectfully requests reconsideration and withdrawal of the rejections of claims 1-3 under 35 U.S.C. § 112 and 35 U.S.C. § 101.

Claim 2 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Ogawa *et al.* (U.S. Patent No. 5,190,832). The applicant respectfully traverses this grounds for rejection. Claim 2 has been canceled and new claims 4-9 are directed to a device comprising the cobalt-nickel-chromium-based alloy of canceled claim 2, wherein the device is selected from the group consisting of: a stent, a spring, a needle, and a guide wire. New claims, 17-22 are directed to a method of treating a patient comprising treating a patient with a device, wherein the device comprises the cobalt-nickel- chromium -based alloy of canceled claim 2, wherein the device is selected from the group consisting of: a stent, a spring, a needle, and a guide wire. The Ogawa *et al.* reference does not teach or suggest a stent, a spring, a needle, or a guide wire comprising the cobalt-nickel-chromium-based alloy of new claims 4-9 and does not teach or suggest a method of treating a patient

comprising treating a patient with a stent, a spring, a needle, or a guide wire comprising the cobalt-nickel-chromium-based alloy of new claims 17-22. Accordingly, a *prima vacie* case of obviousness has not been presented. Therefore, the applicant respectfully requests reconsideration and withdrawal of the rejection of claim 2 under 35 U.S.C. § 103.

Claim 3 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over each of Doherty *et al.* (U.S. Patent No. 4,931,255) or Slaney (U.S. Patent No. 3,767,385). The applicant respectfully traverses this grounds for rejection. Claim 3 has been canceled and new claims 10-16 are directed to a device comprising the cobalt-nickel-chromium-based alloy of canceled claim 3, wherein the device is selected from the group consisting of: a stent, a spring, a needle, and a guide wire. New claims, 23-28 are directed to a method of treating a patient comprising treating a patient with a device, wherein the device comprises the cobalt-nickel- chromium -based alloy of canceled claim 3, wherein the device is selected from the group consisting of: a stent, a spring, a needle, and a guide wire. Neither the Doherty *et al.* reference nor the Slaney reference teach or suggest a stent, a spring, a needle, or a guide wire comprising the cobalt-nickel-chromium-based alloy of new claims 10-16 or teach or suggest a method of treating a patient comprising treating a patient with a stent, a spring, a needle, or a guide wire comprising the cobalt-nickel-chromium-based alloy of new claims 23-28. Accordingly, a *prima vacie* case of obviousness has not been presented. Therefore, the applicant respectfully requests reconsideration and withdrawal of the rejection of claim 3 under 35 U.S.C. § 103.

In view of the foregoing remarks and the amendment above, the applicant believes that the currently pending claims are in condition for allowance, and such action is respectfully requested.

The Commissioner is hereby authorized to charge any fees under 37 CFR §§1.16 or 1.17 as required by this paper to Deposit Account No. 19-0065.

The applicant also invites the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephone interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,

James S. Parker
Patent Attorney
Registration No. 40,119
Phone: 352-375-8100
Fax No.: 352-372-5800
Address: 2421 N.W. 41st Street, Suite A-1
Gainesville, FL 32606-6669

JSP/an
Attachments: Substitute Specification (Marked-up version);
Substitute Specification (Clean version);
Statement Under 37 C.F.R. § 1.125(b); and
Amendment Transmittal Letter.

DESCRIPTION

#8

~~Material for Nuclear Spin Tomography Magnetic Resonance Imaging (MRI)~~

DEVICES FOR NUCLEAR SPIN TOMOGRAPHY MAGNETIC RESONANCE IMAGING (MRI)

Cross-Reference to Related Application

This application claims priority to German Application No. 10108581.8, filed February 22, 2001.

~~Description~~

Background of Invention

~~The invention relates to a material as defined in claim 1.~~

In ~~todays~~ today's interventional nuclear spin tomography MRI, it is desirable to utilize materials of a certain elasticity, such as is used in springs, in biopsy and other automated needles, and cardiovascular or other cavity stents. Titanium based materials exhibiting low field distortion, or image artifacts, in nuclear spin tomography, are in part too brittle and ~~with~~ have insufficient elasticity. Filigree structures imaging isn't optimal either.

Brief Summary of the Invention

~~It is the goal of the~~ The subject invention pertains to ~~present materials, which can optimally satisfy these characteristies~~devices for use in nuclear spin tomography magnetic resonance imaging (MRI). ~~The inventive solution lies in the choice of materials.~~ The subject devices incorporate materials having desirable properties, such as elasticity. In a specific embodiment, the subject device can incorporate ~~Suggested are~~ stainless steels of a cobalt-nickel chrome-based alloy. The subject invention relates to devices for nuclear spin tomography MRI, such as springs, automated needles, stents, cardiovascular stents, torsion springs, coil springs, membrances, and guide wires.

Detailed Description of the Invention

The subject invention pertains to devices for use in nuclear spin tomography magnetic resonance imaging (MRI). The subject devices incorporate materials having desirable properties, such as elasticity. In a specific embodiment, the subject device can incorporatestainless steels of a cobalt-nickel chrome-based alloy. The subject invention relates to devices for nuclear spin tomography MRI, such as springs, automated needles, stents, cardiovascular stents, torsion springs, coil springs, membrances, and guide wires.

The first alloy on a CoNiCr base consists of 42 to 48% cobalt by weight, 19 to 25% nickel by weight, 16 to 20% chromium by weight, 2 – 6% molybdenum by weight, 2 – 6% wolfram by weight, 2.5 to 7.5% iron by weight, as well as additives of titanium and beryllium. The material can be further hardened. It is breakproof and can be utilized for highly challenged small dimensional springs, which must also be antimagnetic.

The material is highly suitable for springs utilized in measuring and display instruments of all kinds, including torsion and coil springs, membranes and other springs requiring high resistance accuracy. It is equally suitable for stents. For this application it is drawn into tiny tubes and subsequently cut into stents. Stents are metallic spring elements that are inserted into cavities in the human body, e.g., cardiovascular vessels, in order to prevent them from closing. The stents are introduced into the body with the help of catheters that are in turn guided in by guide wires. The core of the guide wire frequently consists of a long spring wire and the material cited here is ideally suited for its manufacture.

The material exhibits a high degree of corrosion resistance. Its superior cold fabrication properties in conjunction with good temperability produces an exceptionally durable, fatigue-free substance, that in tempered condition offers very attractive long-term stability values in situations with both high and low metal fatigue windows. Futhermore, the alloy can be utilized in a permanent application up to the middle temperature range, i.e., from -50°C to 350°C. The material has an elasticity modulus of 219.5 to 234.4 kN/mm^2. Due its relative permeability of $<1.005\mu$ it cannot become magnetized in the nuclear spin tomography MRI or nuclear magnetic resonance unit. The material is biocompatible and can be used for implants in the human body.

Another material consists of 39 to 41% cobalt by weight, 15 to 18% nickel by weight, 19 to 21% chromium by weight, 6.5 to 7.5% molybdenum by weight, <0.15% carbon, <1.2% silicon

by weight, <0.01% beryllium by weight, <0.015% sulfur by weight, <0.015% phosphorous by weight, as well as an iron additive. The mechanical properties are similar to those of the first named materials, wherein the elasticity modulus (Youngs modulus) is at 212 kN/mm^2.

The materials are classified under the ISO 5832/7, AFNOR NF S 90-403, ASTM F1058-91 standards, where ISO 5832/7 is a material, as known in the art, having a chemical composition of 39 to 42% (m/m) cobalt, 18.5 to 21.5% (m/m) chromium, 14 to 18% (m/m) nickel, 6.5 to 8% (m/m) molybdenum, 1 to 2.5% (m/m) manganese, up to 1% (m/m) silicon, up to 0.15% (m/m) carbon, up to 0.015% (m/m) phosphorous, up to 0.015% (m/m) sulfur, up to 0.001% (m/m) beryllium, and iron for the balance.

Abstract

The subject invention relates to a material for magnetic resonance imaging, and apparatus incorporating such material. The subject material can comprise cobalt, nickel, and chromium and can be used in nuclear spin tomography MRI. In specific embodiments, the subject material can be used in stents, mechanical springs, and guide wires.